1	1. An apparatus for providing a variable flow of liquid [A controller for
2	varying the flow rate of a pump in a predetermined manner], comprising:
3	
4	a. a controller for varying the flow rate of an AC permanent magnet
5	synchronous motor pump in accordance with AC pulse switching signals applied
6	to said motor pump;
7	
8	<u>b[a]</u> . a programmable micro-controller <u>incorporated into said controller,</u>
9	comprising means [for] calculating in a related manner both the pulse width and
10	frequency [timing for generating] of said AC pulse switching signals [to] for
11	synchronously controlling said motor pump over an extended range of flow rates;
12	and
13	•
14	c[b]. an output switching circuit incorporated into said controller,
15	comprising means [for] generating an AC pulse [d] waveform for driving said
16	motor pump according to said AC pulse switching signals.
17	
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19	2. The apparatus [The pump] of Claim 1 further comprising an AC
20	permanent-magnet synchronous motor <u>pump</u> [and a rotor and impeller assembly
21	coupled to said motor] for providing an output flow of liquid.
22	
23	3. [The rotor and impeller assembly] The apparatus of Claim 2, further
24	comprising a rotor and impeller assembly integrally coupled to said motor pump,
25	wherein said [rotor and impeller] assembly is comprised of a rotor and an
26	impeller, [and] wherein said rotor and said impeller are concentric and wherein
27	said assembly has means defining a rigid coupling between said rotor and said

impeller for preventing relative rotation of said impeller with respect to said rotor.

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Amnt. A, contd.

4. The [controller] <u>apparatus</u> of Claim 1, further comprising a mode switch for choosing the mode of operation of said micro-controller, wherein the mode of operation is selected from a group comprised of a programmed flow control variation mode, an audio input mode, a manual mode and an external data input/output mode.

7. The [controller] apparatus of Claim 1 further comprising:

a. audio circuitry [for causing] with means varying the flow rate of an AC permanent magnet synchronous motor pump [of said motor pump to vary] [proportionately] in proportion to a signal from a microphone or an external audio input, wherein said circuitry further comprises an amplifier with a first potentiometer for varying said amplifier's gain and a detector circuit for providing a varying DC level to an analog to digital converter for input into said microcontroller; and

b. a second potentiometer coupled to said analog to digital converter for adjustment of operational parameters dependent on the switch position of said mode switch.

8. The [controller] <u>apparatus</u> of Claim 1, further comprising a line receiver/transmitter for interfacing an external data input/output signal to said micro-controller.

9. The [controller] <u>apparatus</u> of Claim 1, further comprising rectifier circuitry for converting alternating current to direct current for driving said microcontroller [, said analog to digital converter, said audio circuitry] and said switching circuit[ry].

1	10. The [controller] apparatus of Claim 1, further comprising a [n
2	embedded] software program embedded in said micro-controller for controlling
3	the behavior of said motor pump over time [dependent upon the settings of said
4	mode switch, said first potentiometer and said second potentiometer].
5	
6	12. The apparatus of Claim 2 further comprising [A] a fountain directly
7	coupled to said AC permanent magnet synchronous motor pump for generating
8	variable water patterns comprising:

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a. at least one fountain element comprised of a water inlet and one or more water outlets for the flow of water [;].

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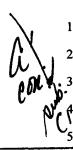
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[b. an AC permanent-magnet synchronous motor pump having a rigidly coupled rotor and impeller, the output of said pump connected to the inlet of said fountain element;]

	1	1. (amended) An apparatus for providing a variable flow of liquid,
	2	comprising:
	3	
	4	a. a controller for varying the flow rate of an AC permanent magnet
<b>β</b> ·	5	synchronous motor pump in accordance with AC pulse switching signals applied
VI.	6	to said motor pump;
$\cup$	7	
	8	b. a programmable micro-controller incorporated into said controller,
	9	comprising means calculating in a related manner both the pulse width and
	10	frequency of said AC pulse switching signals for synchronously controlling said
	11	motor pump over an extended range of flow rates; and
•	12	
	13	c. an output switching circuit incorporated into said controller, comprising
	14	means generating an AC pulse waveform for driving said motor pump according
	15	to said AC pulse switching signals.
	16	
	17	2. (amended) The apparatus of Claim 1 further comprising an AC
	18	permanent-magnet synchronous motor pump for providing an output flow of
	19	liquid.
	20	
	21	3 (amended). The apparatus of Claim 2, further comprising a rotor and
	22	impeller assembly integrally coupled to said motor pump, wherein said assembly
	23	is comprised of a rotor and an impeller, wherein said rotor and said impeller are
	24	concentric and wherein said assembly has means defining a rigid coupling
	25	between/said rotor and said impeller for preventing relative rotation of said
	26	impeller with respect to said rotor.
	27	
	28	

Amnt. A, contd.



4. (amended) The apparatus of Claim 1, further comprising a mode switch for choosing the mode of operation of said micro-controller, wherein the mode of operation is selected from a group comprised of a programmed flow control variation mode, an audio input mode/a manual mode and an external data input/output mode.

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7. (amended) The apparatus of Claim 1 further comprising:

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a. audio circuitry with means varying the flow rate of an AC permanent magnet synchronous motor pump in/proportion to a signal from a microphone or an external audio input, wherein said circuitry further comprises an amplifier with a first potentiometer for varying sáid amplifier's gain and a detector circuit for providing a varying DC level to an analog to digital converter for input into said micro-controller; and

b. a second potentiometer coupled to said analog to digital converter for adjustment of operational parameters dependent on the switch position of said mode switch.

8. (amended) The apparatus of Claim 1, further comprising a line receiver/transmitter for interfacing an external data input/output signal to said micro-controller.

9. (amended) The apparatus of Claim 1, further comprising rectifier circuitry for converting alternating current to direct current for driving said microcontroller and said switching circuit.



10 (amended) The apparatus of Claim 1, further comprising a software program embedded in said micro-controller for controlling the behavior of said motor pump.



- 12. (amended) The apparatus of Claim 2 further comprising a fountain directly coupled to said AC permanent magnet synchronous motor pump for generating variable water patterns comprising:
- a. at least one fountain element comprised of a water inlet and one or more water outlets for the flow of water.

13. The audio circuitry and analog to digital converter of Claim 7, further comprising rectifier circuitry for converting alternating current to direct current for driving said audio circuitry and said analog to digital converter.

14. An apparatus for providing a variable flow of liquid, comprising:

a. a controller for varying/the flow rate of an AC permanent magnet synchronous motor pump in accordance with the simultaneous variation of the voltage and frequency of the AC signal applied to said motor pump;

b. a programmable micro-controller incorporated into said controller, comprising means calculating in a related manner both the voltage and frequency of said AC signal for synchronously driving said motor pump over an extended range of flow rates; and

c. an output circuit incorporated into said controller comprising means generating said AC signal for driving said motor pump.

15. An apparatus for providing a variable flow of liquid, comprising a controller with means simultaneously varying in a related manner the voltage and frequency of an AC signal applied to said motor pump for extending the attainable range of pump flow rates.